THE SURGICAL TREATMENT OF GASTRIC ULCER.*

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There is probably no region of the body at the present day in which there is more surgical interest than the stomach. The recent progress in gastric surgery is largely due to the magnificent work of von Mikulicz, Mayo Robson, Moynihan, and Mayo. These surgeons have had the advantage of attracting and controlling very large amounts of clinical material from which to select their cases. Consequently we have from them many observations upon the treatment of cases which ordinarily do not go to the surgeon, and we have had to, and still, look to them chiefly for advances in the surgical treatment of gastric conditions in general. To make my point more clear it is only necessary to reflect that the surgical treatment of gastric ulcer has been hitherto almost entirely directed to its more serious complications, namely, perforation and cicatricial contraction with its resultant obstructions. It is only in the last few years that hemorrhage from ulcer has been treated, to any extent, surgically, and at the present time we are just beginning to recognize what surgery can do for the chronic ulcer which may give no symptoms beyond slight disturbances of motor sufficiency and indigestion, with occasional exacerbations attended by pain and possible hemorrhage. It is in the latter class of cases that we must look for progress both in diagnosis and treatment, for these cases may proceed to perforation and stenosis for which we know there is no remedy other than surgical intervention. Few surgeons other than those mentioned can report series of operations for ordinary chronic ulcer. For instance, my personal experience includes no such cases but only cases of perforation, pyloric stenosis, or hour-glass contraction and hemorrhage. My hospital service is one of the largest and most active in New York, and the utter absence of cases of ordinary chronic ulcer must be due either to a hesitancy on the part of the general practitioner in that city to resort to surgical measures or to a lack of knowledge as to what surgery can do for such cases.

The treatment of acute gastric ulcer is essentially medical, yet, as has been pointed out by Mayo and others, the exacerbations of a chronic ulcer are probably not infrequently mistaken for an acute ulcer, and the cure is consequently not permanent.

Having stated the aspect of the subject in general, it is my purpose to take up the surgical treatment of the phases of gastric ulcer, namely, perforation, cicatricial contraction, and obstruction, hemorrhage, and chronic gastric ulcer, *per se.*

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PERFORATION. Unless operated upon, 98 per cent. of cases of perforation die. In 1895 Gould[1] was able to collect only 7 cases that had been successfully operated upon. In 1896 Weir and Foote[2] collected 78 cases, with 29 per cent. of recoveries. In this series the mortality among the cases operated upon within twelve hours after the perforation was 39 per cent., between twelve and twenty-four hours 76 per cent. over twenty-four hours 87 per cent.

Since that time the number of operated cases has gone up into the hundreds, with but little change in the mortality other than the betterment produced by the natural improvement in the treatment of peritonitis caused by perforation.

Although advances in general in the treatment of peritonitis have reduced the mortality, the most important advance has been the establishment of the fact that early operation is absolutely necessary for the attainment of good results. To wait for the shock to disappear is simply to invite failure. The shock of a perforation is caused by irritation of the peritoneum, and disappears with the administration of the anæsthetic. Abundant investigations have shown that the contents of the stomach and duodenum are practically sterile, particularly when hyperacidity is present. In a short time, however, the presence of the foreign material in the peritoneal cavity invokes a violent septic peritonitis.

I have not so far lost a case of gastric or duodenal perforation that has come to me within twenty hours of the perforation. In nearly all of these I have washed out quantities of gastric and duodenal contents which had been scattered throughout the entire cavity, and have closed the peritoneum without drainage.

Advance in the treatment of these cases must be in the line of early diagnosis. The diagnosis of a perforative lesion in the upper part of the abdomen is not so difficult; when once seen the picture can hardly be forgotten. If there is a history of antecedent gastric trouble the diagnosis is simpler; but it must be remembered that ulcers outside of the motor area of the stomach may give no symptoms before perforation. A slow or chronic perforation, as it is termed by Moynihan, often gives rise to a local peritonitis and abscess, and the diagnosis may consequently be obscure; yet in these cases there is not the demand for early interference that pertains to acute perforations.

My personal experience with perforated gastric and duodenal ulcers is limited to 6 cases. Two were in women, the ages being twenty and twenty-one years. In both the ulcer was situated on the anterior surface, one at its middle, the other one-and-one-half inches from the cardia. In one the perforation had existed for six days, in the other twenty-one hours. In both, adhesions had formed which had subsequently ruptured, deluging the cavity with gastric contents and pus. Both died: one on the tenth day, the other on the sixteenth day after operation, from sepsis from subphrenic abscesses. Abundant drainage was employed in both cases.

The remaining cases were males. One of these, a man of thirty-five years, was operated upon forty-eight hours after the perforation, and had a general peritonitis. The ulcer was situated just to the left of the pyloric ring. Death occurred on the fifth day from persistence of peritonitis. The remaining three cases recovered. One, a man forty-seven years of age, was operated upon eight hours after perforation. The ulcer was situated at the pylorus and could not be closed by inversion; it was therefore excised, the incision being planned so that a more or less typical pyloroplasty was done. The foreign material was flushed out and the abdomen was closed without drainage. Convalescence was uninterrupted. He now, one and one-half years since the operation, has some symptoms of motor insufficiency, and I have recommended gastroenterostomy. Another case was operated upon six hours after perforation. The ulcer was also situated at the pylorus, which was stenotic. The abdomen was full of gastric contents and bile. The perforation was one-eighth of an inch in diameter and was closed by inversion, thus also closing the pylorus. The abdomen was then flushed out and a posterior gastroenterostomy performed. The wound was closed without peritoneal drainage. Recovery was rapid. The last case was a man twenty-five years of age, with a small perforation of the duodenum close to the pyloric ring, of forty-eight hours' duration. There was a well-established general peritonitis, with marked distention. A diagnosis of appendicitis was made, with a corresponding incision. Afterward a median incision was made, the perforation found and closed, the ileum opened and emptied to permit of reduction of the intestines that had escaped, and again closed; the abdomen thoroughly flushed and drained by a stab wound below the right ribs and by a drain in the pelvis through the first incision. Recovery was somewhat slow but complete.

Recovery in the cases in this series operated upon within twelve hours was rapid and exceedingly satisfactory. The same has been true of a number of traumatic perforations of the stomach and upper intestinal tract that I have operated upon.

CICATRICIAL CONTRACTIONS AND OBSTRUCTION. Obstruction from cicatricial contraction occurs most often at the pylorus, more rarely at other portions, where it gives rise to hour-glass contraction. Lesser grades of interference with motility are caused by perigastric adhesions or even by the mere presence of ulcers without obstruction in the pyloric portion, and will be referred to later in connection with chronic ulcer.

Pyloric and hour-glass obstructions can be helped only by surgical intervention, which gives most excellent results, the mortality in these cases, unless the patient is nearly moribund from inanition, being extremely low, in the neighborhood of 5 per cent.

While in the cases of uncomplicated pyloric obstruction, Finney's operation has been productive of excellent results, in stenosis due to ulcer gastroenterostomy, with or without pylorectomy, appears to be the operation of choice. Apropos of gastroenterostomy, I venture to report one of my cases of hour-glass stomach somewhat fully, since nature had already elected a posterior gastroenterostomy as a solution of the difficulty. In this patient, a woman twenty-six years of age, I found a typical hour-glass stomach, the constriction being at its middle. On turning up the colon I found what was apparently a congenital deficiency in the transverse mesocolon through which a loop of the ileum had passed and become adherent to the posterior wall of the stomach at the site of the contraction. In liberating this loop it became apparent that the ulcer had penetrated through the coats of the stomach and partially through those of the small intestine. In closing the aperture in the stomach I was able to enlarge the constriction and then perform a gastrojejunostomy with the cardiac pouch. This patient has entirely recovered her health and has no gastric symptoms.

HEMORRHAGE. Hemorrhage from gastric ulcer is a serious complication. Savariand[3] places the mortality at 66 per cent. In regard to the surgical treatment there are many differences in opinion. The statistics gathered from the reports of isolated cases are also misleading. These variations are traceable primarily to the numerous phases of hemorrhage occurring from ulcer or, perhaps, to put it better, to the varieties of ulcers which happen to bleed.

We owe to Moynihan[4] the most succinct exposition of the subject of hemorrhage from ulcer. His division of the cases is dependent upon whether the hemorrhage occurs from an acute or chronic ulcer. Hemorrhage from an acute ulcer, although frequently violent and depleting, displays a marked tendency to subsidence under medical treatment. This explains the dictum of other observers, Leube,[5] Hartmann,[6] Lund,[7] and others, that operations should not be done for single large hemorrhages. On the other hand, hemorrhage from a chronic ulcer is usually repeated. The hemorrhages may be frequent and small, resulting only in a persistent anæmia, or they may be large and recur at long intervals, or be rapidly repeated. Again, we may find that the hemorrhage may come from one or many small superficial erosions or from one or several typical chronic ulcers.

These variations in the origin of the hemorrhage constitute therefore the differences in the indications for surgical intervention and in the technique to be employed.

My personal experience has been limited to 5 cases operated upon for hemorrhage, with two deaths. Both the fatal cases had chronic ulcer from which there were several rapidly repeated large hemorrhages. In one the percentage of hæmoglobin was 35 per cent. before operation, in the other 33 per cent. In the first case the ulcer, which was at the middle of the anterior surface of the stomach, was excised, no gastroenterostomy being done. In the second case gastroenterostomy alone was performed. The first case died on the sixth day from what I considered meddlesome treatment in the shape of large repeated infusions, by which the percentage of hæmoglobin was reduced to below 20. The second case died from an extension of the thrombus in the bleeding vessel back into the hepatic artery. In this case the ulcer was situated in the middle of the lesser curvature and had been practically latent. In one of the three cases that recovered a very small round ulcer was excised from the middle of the posterior wall, no gastroenterostomy being done; in the other two, gastroenterostomy alone was performed, the ulcer not being located. These cases had had several fair-sized interval hemorrhages, but were in excellent condition. There has been no recurrence of hemorrhages since the operations. In two of them, however, only three months has elapsed.

My opinion is, that a single large hemorrhage, without previous symptoms referable to ulcer, should not be operated upon, but when there have been antecedent symptoms, operation should be at once performed. In no case should the patient be allowed to drift into a condition of profound anæmia from successive hemorrhages. Also, that cases suffering from recurrent hemorrhages, whether small or large, should be operated upon.

In regard to the nature of the operation I believe that excision of the ulcer combined with gastroenterostomy is the method of choice. Excision, however, is out of the question in profound anæmia and when the ulcers or points of hemorrhage are multiple. It should be done, if practicable, when the ulcer is not in the pyloric portion. Ulcers in the pyloric portion are probably much more amenable to gastroenterostomy alone than when situated elsewhere. Moynihan is a firm believer in the efficacy of gastroenterostomy alone.

CHRONIC GASTRIC ULCER. As already mentioned, the treatment of acute gastric ulcer is essentially medical, since in these cases the results are extremely good. The story in chronic ulcer is different. Russell's[8] statistics derived from a large number of outpatients are that 42.6 per cent. recovered; but of these 27.7 per cent. had had only one attack, and should therefore be classed as acute ulcers, thus leaving only 14.9 per cent. which recovered after having more than one attack. The remaining cases, excepting those that died, were all suffering from gastric symptoms of more or less severity. The average of the figures given by von Mikulicz,[9] Mayo Robson,[10] and others who have collected statistics is not far from

25 per cent. mortality if the deaths from tuberculosis, etc., to which these patients are predisposed, are not included. With these the figures approach 50 per cent. In 1897 von Mikulicz,[9] in a series of 238 operated cases from the clinics of Billroth, Czerny, and himself, found the mortality to be 16.1 per cent. In 1900 Mayo Robson,[10] in 188 collected cases of operations for all complications (excluding perforation and hemorrhage), found the mortality to be 16.4 per cent.; yet in 1901 he reports the mortality of his own cases to be only 5 per cent. Moynihan[4] reports 88 similar cases with a mortality of less than 5 per cent. The Mayos'[11] statistics up to April 1, 1904, in 328 operations for the improvement of gastric drainage, some of which were performed for malignant diseases, are as follows: 20 pyloroplasties, no deaths, but seven secondary operations; 40 Finney gastroduodenostomies, one death; 271 gastrojejunostomies, with a mortality of 6 per cent. in the benign cases. In the very few cases which I have operated upon for benign pyloric or other obstructions I have had no deaths.

It may be well to consider the reasons, other than a distinctly lesser mortality, why surgical treatment has the advantage. Besides the elimination through excision of the tendency to malignant degeneration, which occurs in 6 per cent. of the cases, there are still other points. In the first place it is a question whether the hyperchlorhydria which often accompanies ulcer is not a result instead of a cause of the ulcer. Soupault[14] reports complete relief from hyperchlorhydria and gastrosuccorrhœa in several cases in which pylorectomy was done for ulcer at the pylorus. Pylorospasm, which is frequently caused by the presence of an ulcer, at once yields to excision or gastroenterostomy.

The majority of symptoms causing ulcers are situated in the pyloric portion and are consequently at a point where the utmost benefits are derived from gastroenterostomy. On the other hand, let us for a moment view the matter from the opposite standpoint and consider the dangers of gastroenterostomy. The operative procedure to one who is accustomed to it is very simple and is followed by very little discomfort or shock. I am always surprised at the slight reaction following the operation, it being usually much less than that following the interval operation for appendicitis. The relief, if pyloric obstruction has been present, is immediate, and is evidenced by the general expression of the patient even on the day following the operation.

The vicious circle, owing to better methods, is no longer to be feared. It was due apparently to the employment of a long loop of intestine in either the anterior or posterior operation with a too high implantation in the stomach. It has been combated by an enteroenterostomy, by the Roux method, by a lower implantation, and, finally, by eliminating the loop and using the very commencement of the jejunum where it naturally lies in relation with the posterior wall of the stomach, as in the Petersen operation. I have found that this method gives excellent results.

Peptic ulcers in the jejunum sometimes follow gastroenterostomy. Mikulicz,[12] in a study of 15 cases, finds that they are not dependent upon a hyperchlorhydria as is usually supposed, but that they may occur when the percentage of hydrochloric acid is below normal. He also finds that they occur only after anterior gastroenterostomy. This may be explained by the fact that a much longer loop of jejunum is necessary in the anterior operation and that consequently the mucous membrane is less protected by the bile.

The danger of contraction of the anastomotic opening is largely preventable by a proper technique which eliminates the production of excessive scar tissue.

Many ask, "Why does gastroenterostomy cure gastric ulcer?" The explanation of its curative action upon ulcers situated in the pyloric portion is simple. This part of the stomach is very muscular, and its chief function is to force the partially digested food through the pylorus. Consequently an ulcer situated there is constantly subjected to traumatism, not only by the contractions of the stomach, but also by the passage of food across it. This trauma is accentuated if there is any obstruction, organic or spasmodic, at the pyloric opening. A proper drainage opening situated to the left of the pyloric portion at the most dependent part of the stomach affords complete rest to the pyloric portion and at the same time drains away any excess of gastric secretion.

Its beneficial action upon ulcers in the cardiac portion is not so clear, but here, also, the more rapid emptying of food and secretions must produce some result. If possible, however, it seems to me that excision of ulcers in the cardia should be practised.

But besides the institution of drainage there is a further field for surgery in the liberation of adhesions, the plication of dilated stomachs, and in fixation.

Viewing the results surgery has accomplished in these cases, one must concede that the treatment of gastric ulcer should be, at least, largely surgical. Our plea is for earlier resort to surgical measures; not only in ulcer but in malignant disease. By the time the diagnosis is evident by chemical or physical aids the patient is often beyond relief. As Munro[13] puts it, surgical treatment should be instituted "not late but early; not as a last resort, but before the starvation, the long suffering from pain, dyspepsia, and fermentation absorption have reduced the patient until he is beyond surgical help; before he is anæmic from persistent bleeding or peritonitic from culpable delay."

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A CASE OF GENERAL MILIARY TUBERCULOSIS, WITH AN OPEN FORAMEN OVALE AS A FACTOR IN ITS PRODUCTION.

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THE role of a persistent foramen ovale in permitting pieces of thrombi and tumor cells to pass directly from the right auricle to the left side of the heart has been brought into prominence by various investigators. In none of the literature consulted is there mention of the passage of bacteria through such an opening in the interauricular wall. It is our opinion that we have a case in which tubercle bacilli were disseminated through the avenue of an open foramen ovale. Other interesting features of the case now to be described are the extent and size of the tuberculous nodules on the peritoneum and the tuberculous invasion of the pancreas. Though aware of the hypothetical nature of the conclusion regarding the pathogenesis, I feel, from the data, that the inference is highly probable and of great interest in relation to general miliary tuberculosis. Throughout the work I have had the assistance and helpful criticisms of Dr. A. P. Ohlmacher, the director of the pathological laboratory of the Ohio Hospital for Epileptics.

Clinical History. Only the following points have been obtainable: C. E., aged twenty-four years, was a male, colored, an imbecile, and an inmate of the Ohio Hospital for Epileptics for ten years. He had had idiopathic epilepsy for thirteen years. His grand mal attacks occurred principally at night and at irregular periods. His family and previous history were unobtainable, except that until the day before his death he was up and about and that within the last two months of his life he had failed visibly in weight and strength. His physician was called one evening for the reason that during an attack the patient had bitten his tongue severely, almost severing the organ about an inch from the tip. Examina-